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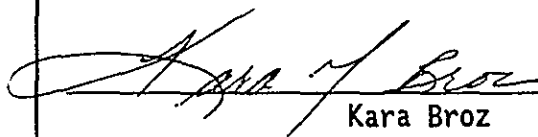
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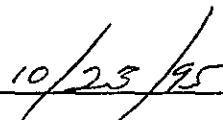
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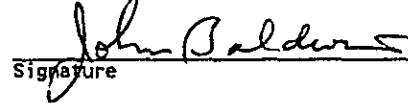
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**ANALYTICAL SERVICES**

**60-DAY SAFETY SCREENING AND FERROCYANIDE RESULTS FOR TANK 241-BY-108,  
ROTARY SAMPLES, CORE 98 AND CORE 104**

**Date Printed:**

**OCTOBER 18, 1995**

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**WHC-SD-WM-DP-145, REV. 0**

**NARRATIVE**

60-DAY SAFETY SCREEN RESULTS FOR TANK 241-BY-108  
ROTARY SAMPLES, CORE 98 AND CORE 104

ANALYTICAL SUMMARY

Core samples from tank 241-BY-108 (BY-108) were received at the 222-S Laboratories and underwent safety screening analyses, consisting of differential scanning calorimetry (DSC), thermogravimetric analysis (TGA), and total alpha activity (*Tank 241-BY-108 Tank Characterization Plan* (TCP)[1]). Results of total organic carbon (TOC) and cyanide (CN) analyses are included for those samples which exceeded DSC action limit.

As required by the *Tank Safety Screening Data Quality Objective* (DQO) [2], a 95% confidence interval was calculated for the sample results exceeding an action limit. The precision requirements of the SAP were satisfied by comparing a one-sided 95% confidence interval of the mean for each sample to the action limit, rather than requiring a relative percent difference between sample and duplicate results of less than 10%. The DSC analysis at the 95% confidence level found the DSC results of three samples exceeded the maximum limit stated in the DQO (Table 4). Notifications by the Chemist and Project Coordinator were made as required.

Before samples were removed from BY-108, an industrial hygiene technician field tested the tank vapors. The technician purged the vapor probe sample tube for five minutes then field measured vapor stream contents using a combustible gas indicator (CGI) and an organic vapor meter (OVM). The technician verbally reported an LEL of 5.0%, an oxygen content of 20 R, and a total organic carbon content of 71.8 ppm using the OVM. Draeger tubes were not used to estimate the ammonia content.

When compared to the decision rules in the DQO, none of the data indicate that the tank should be considered "unsafe." The tank can be considered "safe" once it has been determined that no flammability concern exists in the tank vapor space.

SCOPE

This document serves as the 60-day report deliverable for the tank BY-108 core samples collected on July 27 through August 16, 1995 (Core 98, Segments 1-4 and Core 104 Segments 1-5). The 222-S Laboratories received, extruded, and analyzed each sample in accordance with the TCP. Included in this report are the primary safety screening results obtained from the analyses, and copies of all DSC and TGA raw data scans as requested in the SAP. Also included are the TOC and CN results for those samples that exceeded the DSC action limit. Any additional analyses conducted by the 222-S Laboratories on the BY-108 core samples will be included in a revision to this report. Partial BY-108 core segments from cores 97, 100 and 102 were received from BY-108 but were not analyzed as they duplicated segments of cores 98 and 104. Core 99, a core taken from the same riser as core 98, was sent to PNL's 325 Laboratory for analysis and the results of those analyses will be reported by PNL in a separate document.



SAMPLE RECEIPT, EXTRUSION, AND SUBSAMPLING

The subject core samples reported herein were taken from Tank BY-108. The two samples are identified as Core 98 and Core 104. These core segment samples were received at the 222-S Laboratory between July 28 and August 21, 1995 and extruded between August 1 and August 24, 1995. Table 1 provides the sampling and extrusion report for the two core samples. With the exception of segment 1, of both cores, the recovery was good and each segment was broken into quarter segments and homogenized. Segment 1, for both cores, was treated as a "whole" segment and homogenized. Additional extrusion results are presented in Table 2.

As shown in Table 1, there were some quarter segments missing upon extrusion, that is, there was a gap where that quarter segment would have been expected. Where drainable liquid was obtained, it is believed the liquid originally occupied this gap and accounts for the missing quarter segment. Subsamples for laboratory analyses and archiving were created per the tank TCP.

TABLE 1: SUMMARY DESCRIPTION OF AUGER SAMPLES

Core and Segment* Number	Riser	Sample Total Weight (Grams)	Sample Collection General Description
Core 98 Segment 1(W)	12A	366.8	Extruded approx. 5-6 inches of sample. Sample was wet. Texture of sample was crystalline and tended to "melt" on the sample tray. Sample was light brown to dirty white in color. Collected 170 ml of drainable liquid. Color of liquid was Yellow and opaque.
Core 98 Segment 2 (A), (C), (D)	12A	416.0	Collected 100 ml of drainable liquid, which was yellow brown in color and opaque. Extruded approx. 12 inches of sample. Facies present; Sample was divided into quarter segments. Sample texture ranged from a brown sludge to a material resembling a mixture of brown, beige and dirty white saltcake.
Core 98 Segment 3 (A), (C), (D)	12A	406.5	Collected 60 ml of drainable liquid, which was light brown in color and opaque. Extruded approx. 16.5 inches of sample. Facies present; Sample was divided into quarter segments. Sample texture ranged from a brown sludge to a material resembling a mixture of brown, beige and dirty white saltcake.

Core 98 Segment 4 (A), (B), (C), (D)	12A	490.0	No drainable liquid observed or collected. Extruded approx. 19.0 inches of sample; Sample retained its shape. Facies present; Sample was divided into quarter segments. Sample texture ranged from a brown sludge to a material resembling a mixture of brown sludge with white saltcake.
Core 104 Segment 1(W)	7	131.3	Extruded approx. 6-7 inches of sample. Sample was tan in color, dry, crystalline and granular in shape. No drainable liquids.
Core 104 Segment 2 (A), (B), (C)	7	383.5	No drainable liquid. Extruded approx. 19.0 inches of sample; Upper half segment retained its shape, lower half segment crumbled during extrusion. Facies present in upper quarter segment (crumbly saltcake to sludge). Sample was divided into three quarter segments. Sample texture ranged from a brown sludge to a material resembling a mixture of brown sludge with saltcake.
Core 104 Segment 3 (A), (C), (D)	7	288.8	No drainable liquid. Extruded approx. 17.0 inches of sample; Sample was wet, granular and did not retained its shape. Sample was divided into three quarter segments. Sample texture resembled a brown saltcake.
Core 104 Segment 4 (A), (C), (D)	7	318.3	No drainable liquid. Extruded approx. 18.0 inches of sample. Sample was wet, granular, crumbly and ranged from a yellow to brown crystalline saltcake. Sample was divided into three quarter segments.
Core 104 Segment 5 (A), (B), (C), (D)	7	422.7	No drainable liquid. Extruded approx. 18 inches of sample. Lower half retained its shape and was medium to dark brown, whereas the upper half was dark brown and partially retained its shape. Texture of material resembled a sludge. Sample was divided into four quarter segments.

\* (x) represents the quarter segment where "W" represents a whole segment and "A", "B", "C" and "D" represent the quarter segment location with "A" the top of the segment and "D" the bottom of the segment.

## ANALYTICAL RESULTS

Analytical results are presented in Table 2.

### Differential Scanning Calorimetry (DSC)

DSC analyses were performed under a nitrogen atmosphere using procedure LA-514-113, Rev. B-1 or procedure LA-514-114, Rev. B-0. The results are shown in Table 3 and the raw data scans are attached. The samples were analyzed in duplicate. Any exotherms on the scans would be visible as a rise (Mettler) or a sink (Perkin Elmer) from the baseline established at the beginning and ending of the scan.

Three of the samples exhibited exotherms above the action limit or 481 j/g, therefore, the upper 95% confidence level values calculated for each sample and the results are presented in Table 2.

### Thermogravimetric Analysis (TGA)

Weight percent water is calculated from weight loss by TGA. These analyses were performed under a nitrogen atmosphere using procedure LA-560-112, Rev. A-2 or LA-514-114, Rev. B-0. The samples and their related "immediate" samples from the un-homogenized extrusions were analyzed in duplicate. "Immediate" samples are samples for TGA analysis that were immediately taken directly from the un-homogenized sample as it was extruded onto the extrusion tray. TGA as well as DSC analyses were performed on homogenized samples for each sample. The results are presented in Table 2, and the raw data scans are attached.

### Alpha Total

Analyses for total alpha activity were performed. Samples were prepared by fusion using procedure LA-549-141, Rev. D-0, and analyses were performed using procedure LA-508-101, Rev. D-2. Two fusions were prepared per sample (for duplicate results). Since all of the results were well below the safety screening limit of 41  $\mu\text{Ci/g}$ , reruns to improve standard and spike recoveries or relative percent difference (RPD) were deemed unnecessary. The total alpha results are presented in Table 2.

### Total Organic Carbon (TOC)

Three samples which had DSC results above the action limit were submitted for TOC analysis. Analyses were performed in duplicate according to procedure LA-342-100, Rev. C-0. The results are presented in Table 3. The RPD for sample S95T001977 exceeded the required  $\pm 10\%$  range. A "triplicate" analysis was performed with a TOC result of 1.39  $\text{ug/g}$  which closely resembles the "duplicate" value.

Cyanide

Three samples which had DSC results above the action limit were submitted for cyanide analysis. Analyses were performed in duplicate according to procedure LA-695-102, Rev. D-0. The results are presented in Table 3.

Responsible Project Coordinator: J. H. Baldwin

REFERENCE

- [1] J. H. Baldwin, "*Tank 241-BY-108 Tank Characterization Plan*", WHC-SD-WM-TP-275, Rev. 0D, Westinghouse Hanford Company, Richland, Washington, July 19, 1995.
- [2] H. Babad, J. W. Hunt, and K. S. Redus, "*Tank Safety Screening Data Quality Objective*", WHC-SD-WM-SP-004, Rev. 1, Westinghouse Hanford Company, Richland, Washington, April 27, 1995.

Table 4. 95% Upper Confidence Interval Limits  
for DSC (Units are in joules/g).

Sample Description	Sample Number	Differential Scanning Calorimetry (DSC) Dry Basis				TGA* Average  (%H2O)
		Sample Result (J/g)	Dup. Result (J/g)	Average Result (J/g)	95 % UL	
Quarter Segment B from Core 98 Segment 4	S95T001420	509.1	522.6	558.0	697.7	35.61
Rerun	S95T001420	481.3	409.5	445.4	672.0	35.61
Quarter Segment B from Core 104 Segment 5	S95T001976	593.5	522.6	558.0	781.8	36.66
Quarter Segment C from Core 104 Segment 5	S95T001977	548.7	507.9	528.3	657.1	35.50

TGA = Thermogravimetric Analysis

Quarter Segment B is approximately the second 5 inches of material of the segment. Quarter segment C is approximately the third 5 inches of material from the top of the segment.

Due to the large volume,  
a copy of the data  
supporting the Data  
Validation Report and  
the Sample Data Summary,

Pages 8 thru 346,

is available only from  
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